EXTREME FLIGHT RADIO CONTROL™

STATE-OF-THE-ART R/C AEROBATIC AIRCRAFT AND ACCESSORIES

50cc Edge 540T ARF

Instruction Manual

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Please take a few moments to read this instruction manual before beginning assembly. We have outlined a fast, clear and easy method to assemble this aircraft and familiarizing yourself with this process will aid in a quick, easy build.

Please read the following paragraph before beginning assembly of your aircraft!

THIS IS NOT A TOY! Serious injury, destruction of property, or even death may result from the misuse of this product. Extreme Flight RC is providing you, the consumer with a very high quality model aircraft component kit, from which you, the consumer, will assemble a flying model. However it is beyond our control to monitor the finished aircraft you produce. Extreme Flight RC will in no way accept or assume responsibility or liability for damages resulting from the use of this user assembled product. This aircraft should be flown in accordance to the AMA safety code. It is highly recommended that you join the Academy of Model Aeronautics in order to be properly insured, and to operate your model at AMA sanctioned flying fields only. If you are not willing to accept ALL liability for the use of this product, please return it to the place of purchase immediately.
Extreme Flight RC, Ltd. guarantees this kit to be free of defects in materials and workmanship for a period of 30 DAYS from the date of purchase. All warranty claims must be accompanied by the original dated receipt. This warranty is extended to the original purchaser of the aircraft kit only.
Extreme Flight RC in no way warranties its aircraft against flutter. We have put these aircraft through the most grueling flight tests imaginable and have not experienced any control surface flutter. Proper servo selection and linkage set-up is absolutely essential. Inadequate servos or improper linkage set up may result in flutter and possibly the complete destruction of your aircraft. If you are not experienced in this type of linkage set-up or have questions regarding servo choices, please contact us at info@extremeflightrc.com or 770-887-1794. It is *your* responsibility to ensure the airworthiness of your model.

A few tips to ensure success

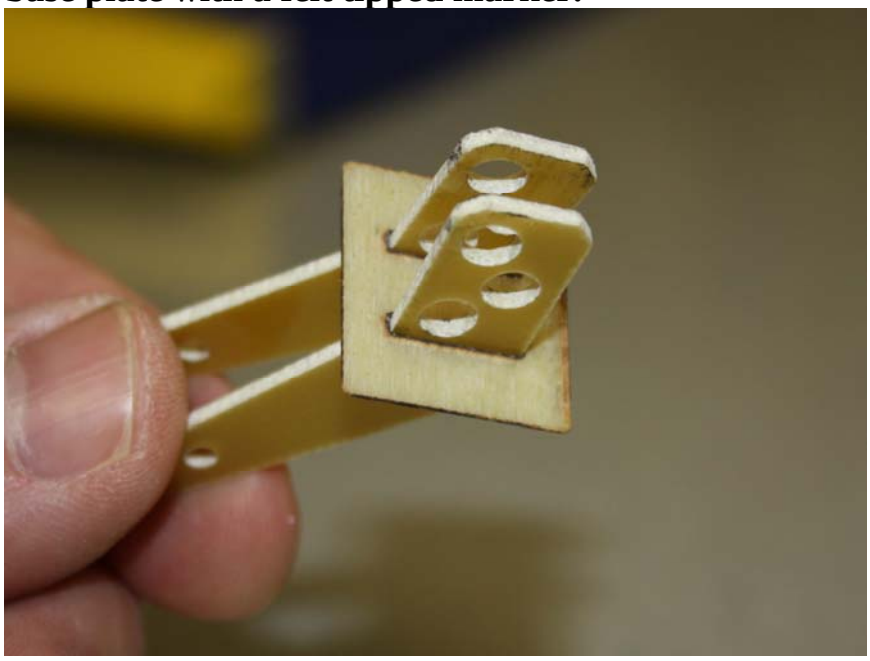
1. **We are very pleased with the level of craftsmanship displayed by the builders in our factory. Through hundreds of grueling test flights containing maneuvers that no aircraft should be subjected to, our prototypes have remained rigid and completely airworthy. However, it is impossible for us to inspect every glue joint in the aircraft. Take a few minutes and apply some medium CA to high stress areas such as servo mounting trays , landing gear blocks, anti rotation pins, etc.**
2. **Having survived the journey half way around the world while experiencing several climate changes, it is not uncommon for a few wrinkles to develop in the covering. Fear not! These are not manufacturing defects, and are easily removed with a little bit of heat. Use a 100% cotton tee-shirt and your heat gun and heat the covering while gently rubbing the covering onto the wood with the t-shirt. Be careful not to use too much heat as the covering may shrink too much and begin to lift at the edges. Take your time, and a beautiful, paint like finish is attainable.**
3. **By the time your aircraft arrives at your door step it will have been handled by a lot of people. Occasionally there are small dings or imperfections on some of the surfaces. An effective method to restore these imperfections to original condition is to use a very fine tipped hypodermic needle to inject a drop of water under the covering material and into the ding in the wood. Apply heat to the area with a sealing iron and the imperfection will disappear. Deeper marks may require that this process be repeated a couple of times to achieve the desired result, but you will be surprised at how well this technique works.**
4. **DO NOT SKIMP ON SERVOS! Your aircraft is equipped with very large control surfaces that deflect over 45 degrees. A lot of servo power is required to prevent flutter and to maintain the required deflection for maneuvers. We absolutely recommend the use of METAL GEARED servos with a minimum of 250 oz. in of torque.**
5. **Use a high quality epoxy for installing the composite control horns and hinges. We highly recommend the use of Pacer Z-Poxy 30 minute formula. We have used this glue for many years with zero failures. Recently we have been experimenting with Pacer Hinge Glue and are very pleased with the results and ease of application and clean up.**
6. **You may want to add a bead of silicone glue (Pacer Zap-A-DAP-A-GOO, etc.) or RC-56 Canopy glue to the intersection of the plastic canopy/hatch and its wood frame for additional strength and resistance to vibration. DO NOT USE CA here as it will fog the canopy.**
7. **Your aircraft is built using very modern construction techniques and is very light weight for its size. As with any high performance machine, regular inspection and maintenance is a must. While disassembling your aircraft after a flying session, pay close attention and inspect glue joints, linkages and loose covering to be sure the airframe is sound. A few minutes spent doing this will help maintain airframe longevity.**
8. **Be sure to put a drop of blue Loctite thread locker on every bolt on this aircraft! Failure to do so may cost you your aircraft!**

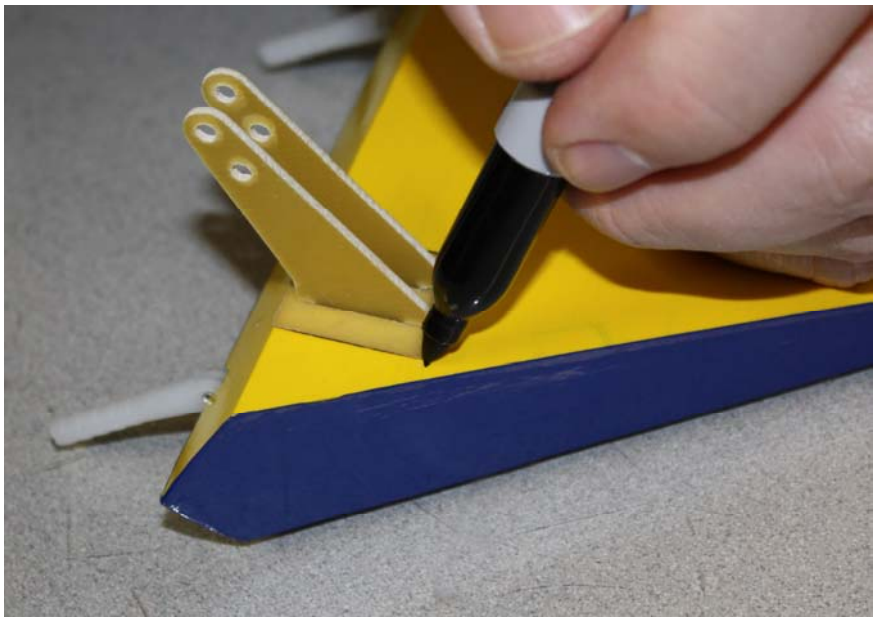
Congratulations on your purchase of the Extreme Flight RC 50cc Edge 540T ARF!
The Extreme Flight Edge 540T is loaded with unique features, including first rate hardware and components and thorough instructions to ensure a trouble free assembly and set-up. Weight saving components are used throughout such as a carbon fiber wing and stab mounting tubes, aluminum landing gear, titanium pushrods and a carbon fiber tail wheel assembly, all ensuring the lightest, most high performance aircraft possible.
You will notice there is a box built into the bottom of the Edges's fuselage. This is a pipe tunnel and will accommodate most canister mufflers and tuned pipes sold for the current makes of 50cc gas engines.
The performance ability of the Extreme Flight RC Edge 540T is incredible! If aggressive 3D flying is your passion, then the new Extreme Flight RC 50cc Edge 540T is the airframe you've been waiting for. Long heralded as the ultimate 3D platform, the Edge series of aircraft are known for their unmatched stability in high alpha flight and their aggressive gyroscopic tumbling maneuvers. The Extreme Flight Edge 540T builds on this stellar reputation, offering unmatched flight performance and the quality construction and attention to detail that you've come to expect from an Extreme Flight product.
We have spent a great deal of time and effort to provide you, the discriminating aerobatic enthusiast, with the highest quality, most complete package possible. We are very proud of the end result of our labor and wish you great success with the assembly and flying of your Extreme Flight RC 50cc Edge 540T!

Elevator

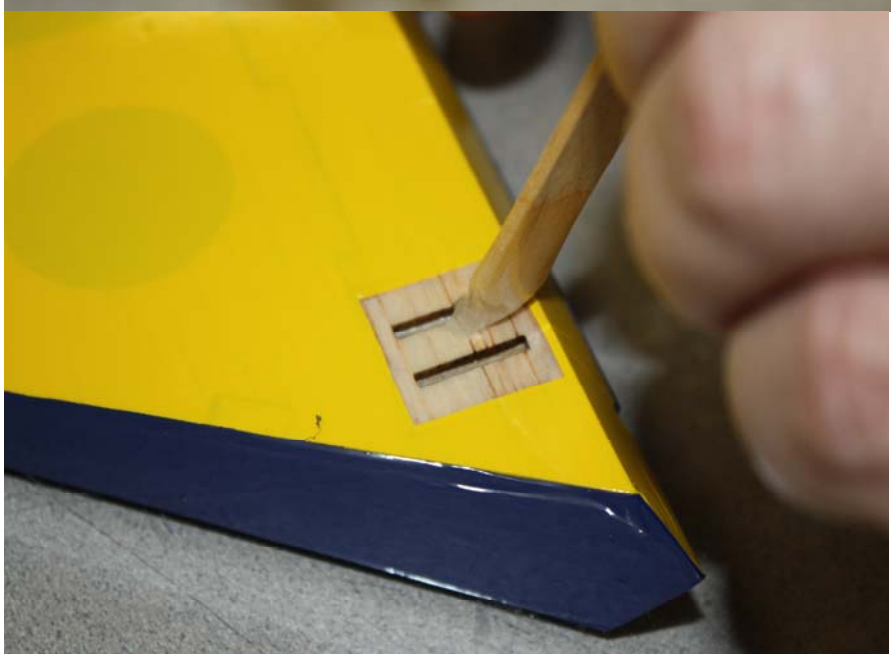
1. Locate the horizontal stabilizer/elevator assemblies as well as the composite control horns and base plates from the elevator hardware package. Use a sharp #11 blade to make a cut in the covering over the 2 slots for the elevator control horns on the bottom of the elevator surface. Double check to make sure you are cutting into the bottom of the elevator.

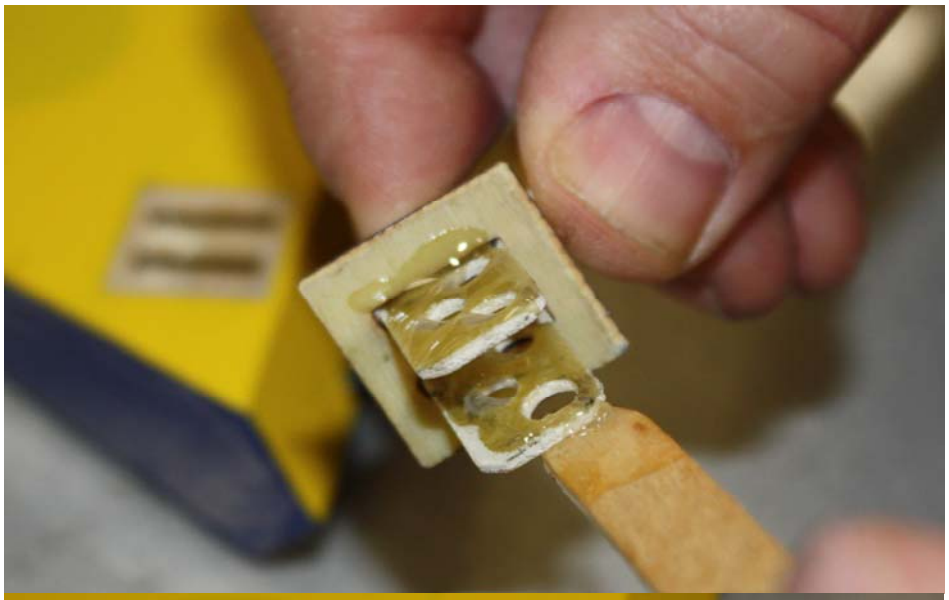
2. Insert the 2 control horns into the base plate and trial fit the horns into the slot and make sure they seat properly against the base and elevator surface. Trace around the base plate with a felt tipped marker.

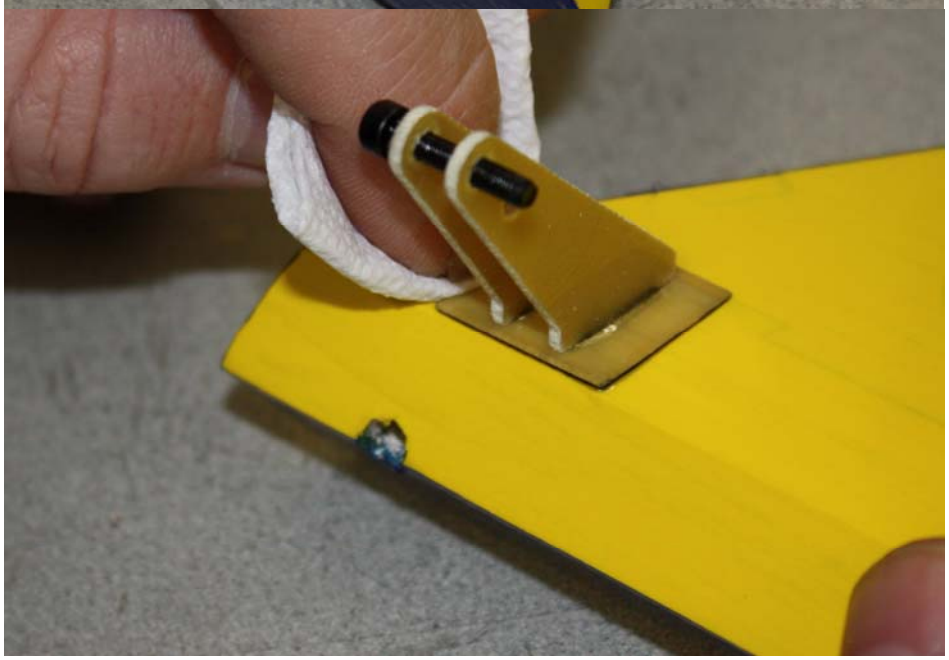




3. Remove the horn assembly and use your #11 blade to remove the covering from inside the ink line you traced around the control horn base. Wipe away the ink line with a paper towel soaked in denatured alcohol. Scuff the portion of the horns that will be inserted into the elevator with sandpaper. Apply 30 minute epoxy to the slots and thoroughly coat the horns and base plate bottom. Reinsert the assembly into the elevator and wipe away any excess epoxy with a paper towel and denatured alcohol. Place a 3mm bolt through the horns to help insure proper alignment and set aside to dry. Repeat for the other elevator half.

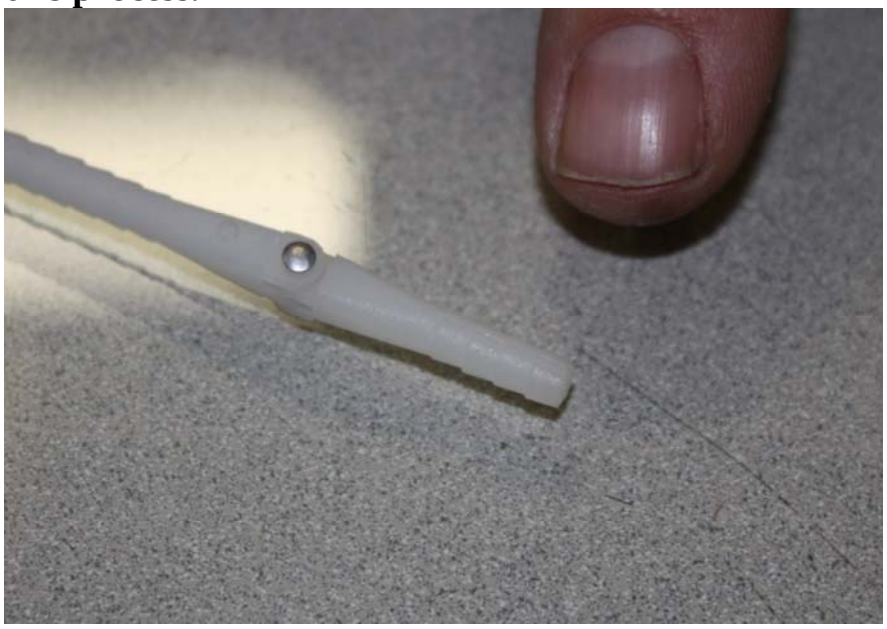


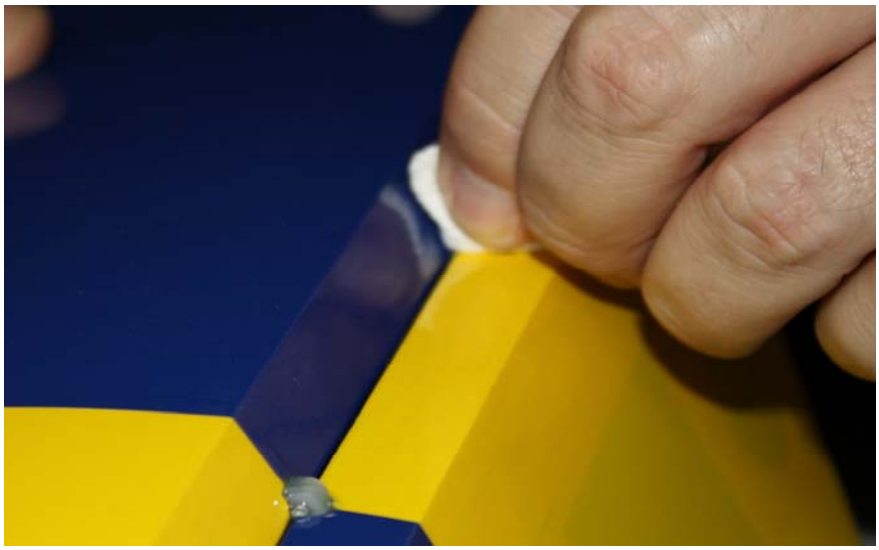




4. In this step I will outline the procedure we use to install the hinges. There are several ways to do this and several adhesives you can use. We will describe the way we do it, as this method has proven itself over many years of model building. If you are new to this type of hinging process then I recommend that you install a single hinge first just to acquaint yourself with this method.

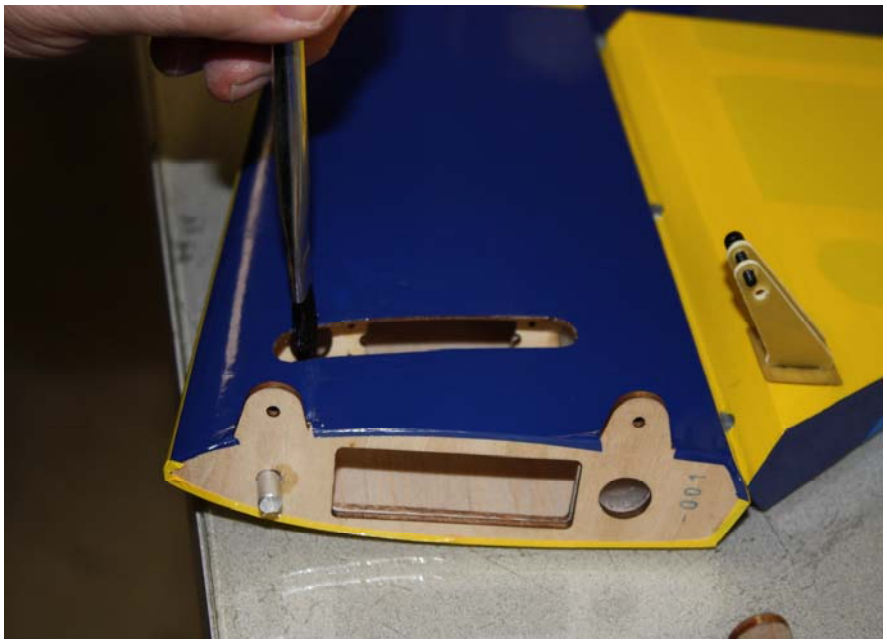
Before starting the process get a few items together that will aid you as you proceed. You will need the following items: 30 minute epoxy (we recommend Pacer Z-Poxy), a scrap piece of pushrod or 1/8" dowel, paper towels and denatured alcohol. Locate 4 hinges per elevator half. You will need to cut 2 hinges just beyond the second knuckle to clear the fiberglass tube socket in the stabilizer. Insert the carbon fiber wing tube into the socket while testing for proper hinge length to avoid damaging the fiberglass sleeve. Mix a generous batch of 30 minute epoxy. Use the pushrod or dowel to thoroughly coat and fill the hinge hole with epoxy, then coat the hinge with epoxy. Push the hinge into its hole until the joint is about a ¼" from its final position and use a paper towel to remove the excess epoxy that has been forced from the hole. Push the hinge the rest of the way in and make sure the hinge pin is centered in the hinge line. Use some denatured alcohol and a paper towel to remove all excess epoxy, especially on the hinge pin. When you are satisfied with the result set the surface aside to dry. Position the drying piece so that any excess epoxy will pool around the rear of the hinge. When you are comfortable with this process you should be able to do one side of a surface per batch of epoxy. Glue all hinges into the stabilizer first. After the glue has set trial fit the elevator to the stab and adjust if necessary. There should be as little gap as possible between the stab and elevator. When satisfied with the fit remove the elevator and repeat the gluing process outlined above. Be sure to wipe away all excess epoxy! Set aside to dry. Repeat this process for the other stab/elevator half. Please see the following series of pictures that will aid in visualizing this process.



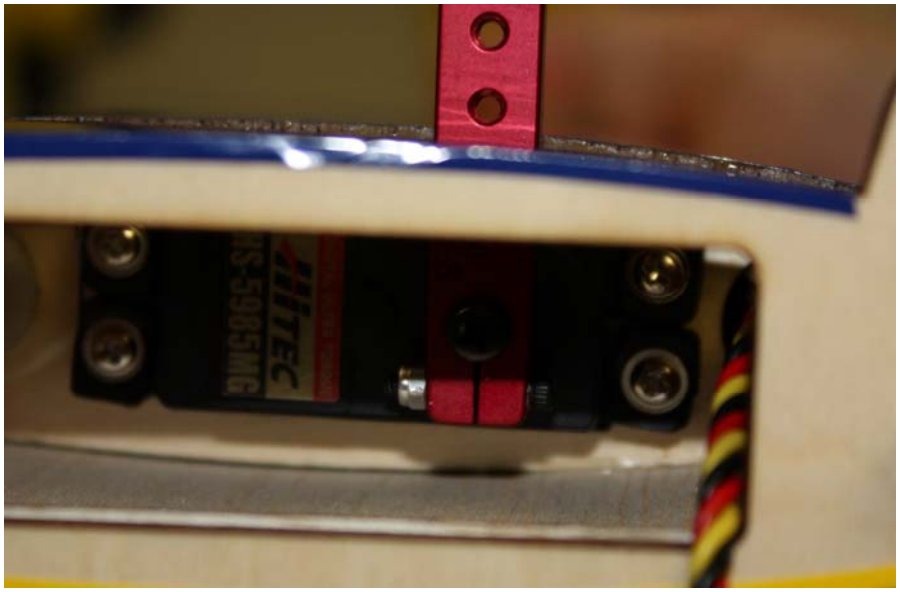


5. After the hinges have dried thoroughly, pull on them to make sure they are properly installed. The hinges will probably feel a little stiff as it is almost impossible to get all of the glue out of the knuckle joint. Use a fine tipped hypodermic needle and place one (only one!) drop of acetone on each side of the hinge pin. Move the elevator back and forth a few times and you will feel it loosen up. Be careful to only use one drop as you don't want to weaken the glue joint! Add a drop of penetrating oil to each hinge pin and you will ensure a smooth operating surface with no binding. Seal the bottom of the hinge gap with a strip of Ultracote or Blenderm tape. Be sure to fully deflect the control surface when applying the tape or Ultracote to allow full deflection once the gap is sealed. Repeat this process for the other stab/elevator assembly.

6. Use your hobby knife to remove the covering from the slot in the bottom of the stab for the elevator servo horn. You may want to brush a coat of alcohol thinned epoxy along the edges of the opening to prevent gas/oil from seeping under the covering.



7. Install the elevator servo using the manufacturer supplied mounting hardware with the output shaft toward the front of the stab. It will be easier to electronically center the servo and install the servo arm before screwing the servo into position. We recommend the SWB 1.5 inch servo arm. Route the servo lead out of the hole in front of the servo.

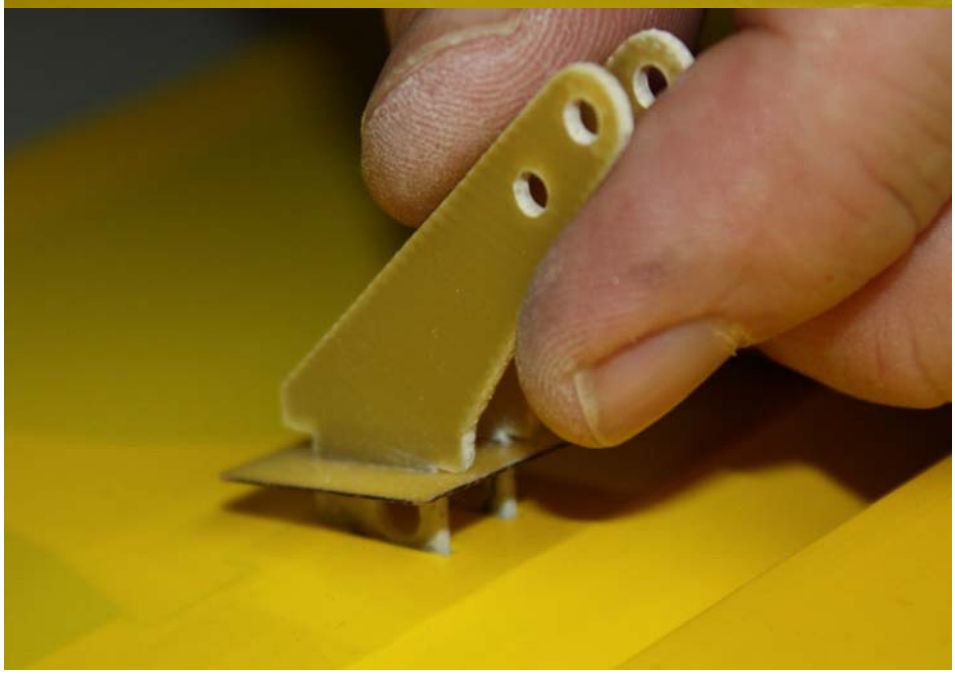


8. Locate 2 ball links and a titanium turnbuckle pushrod. Thread the ball links onto the pushrod and install using the supplied 3mm bolts, nuts and washers as shown in the picture. You may find it necessary to enlarge the slot in the bottom of the stab to allow for maximum travel.

9. Before you set aside the stabs take a moment with your covering iron and go over all of the seams with a medium heat setting, paying special attention to the ends of thin trim stripes. Clean the 2 elevator/stab assemblies with Windex and set them aside.

Wing Assembly

10. The assembly process for the wing is almost identical to that of the stab/elevator. For this reason we will not go into quite as much detail as in the previous procedure. Remove the aileron from the wing panel. Locate the 2 slots for the control horns and remove the covering from the slots with a sharp #11 blade. Follow the same procedure as outlined previously to install the control horns into the control surface and hinge the wing. Repeat this procedure for the other wing.



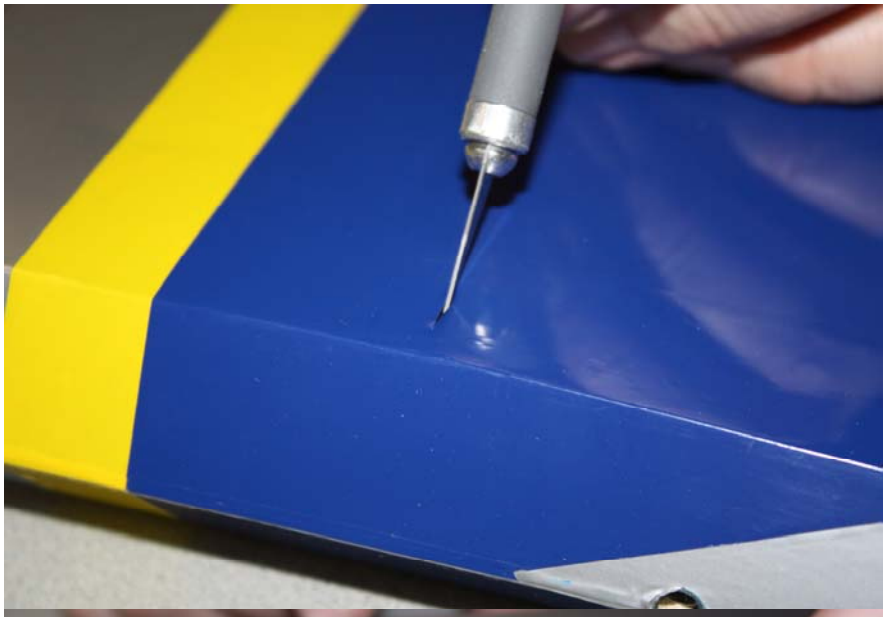
11. Locate the aileron servo mount and remove the covering from this area. Use a sealing iron to seal the edges of the covering to the sides of the servo opening. Take a few minutes to apply some CA to the joints of the servo rails and the ribs.

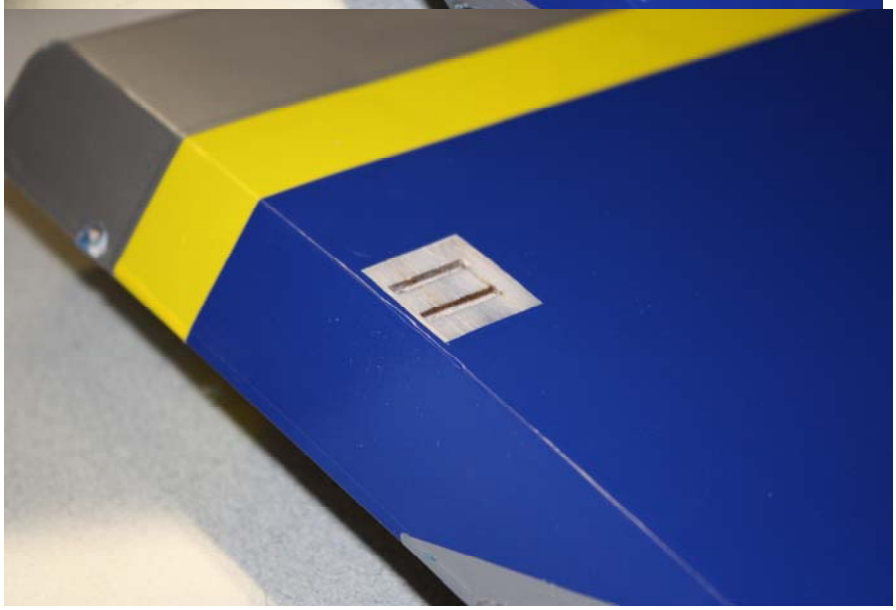
12. Attach a 12" servo extension to your servo and secure with thread or heat shrink tubing. Use the manufacturer supplied mounting hardware and install the servo with the output shaft toward the leading edge of the wing. Electronically center your servo. Aileron servo arm length should be 1.50". We use and recommend the SWB double lock aluminum arms. Thread 2 ball links onto the titanium turnbuckle pushrod. Secure the pushrod to the control horns and servo arm as shown in the picture using the supplied 3mm bolts and nylon insert locknuts. As always, use blue Loctite on ALL bolts!

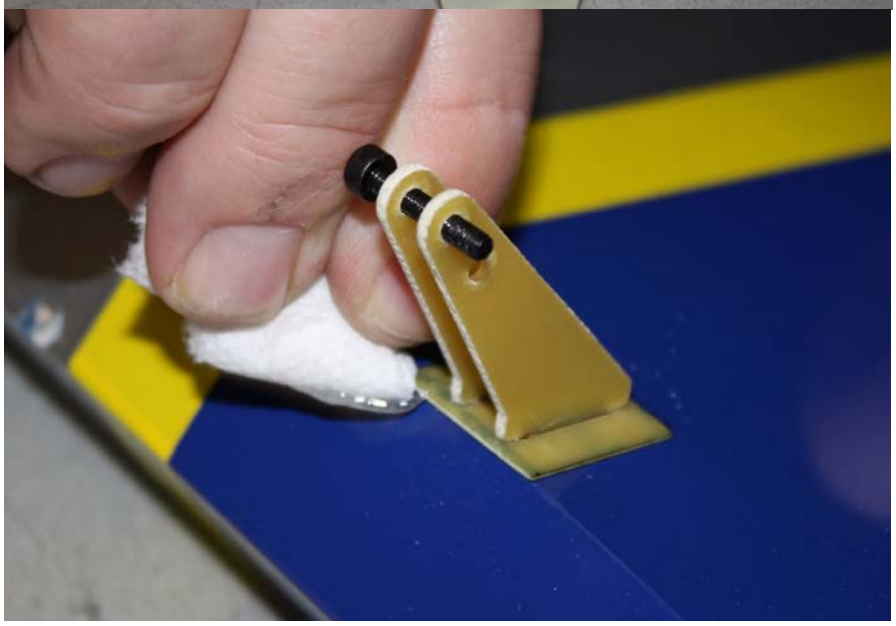
13. Before beginning the next assembly process, take a few minutes with your sealing iron on a medium heat setting and go over all seams, paying special attention to thin trim stripes and the seam at the leading edge of the wing. If there are wrinkles in the covering on the leading edge sheeting use a heat gun with a 100% cotton t-shirt to remove them and prevent digging into the wood with an iron. Use caution and avoid excessive heat as you may cause the Ultracote to shrink too much and lift at the seams. Also take the time to seal the hinge gaps with Ultracote or Blenderm tape. Clean the wings with Windex and put them away.

Rudder horn installation

14. Locate the rudder, the rudder control horns and the 2 slotted base plates. Use a sharp #11 blade to remove the covering from the 2 pre-cut slots in the rudder. Trial fit the 2 rudder horns through the slots in the base plate and into the slots in the rudder. Trace around the base plate with a fine tip felt marker. Remove the control horns and cut away the covering from the area where the base plate will mount as done previously with the aileron and elevator. Mix up some 30 minute epoxy and use a small blade to fill the 2 slots with epoxy. Use plenty of epoxy and be sure to completely fill the two slots. Use an epoxy brush to completely cover the areas on the rudder horns and base plate that will glue into the rudder. Slide the rudder horns back into their proper position and immediately wipe the excess epoxy from the horns. Repeat this process on the other side of the rudder.







Fuselage Assembly

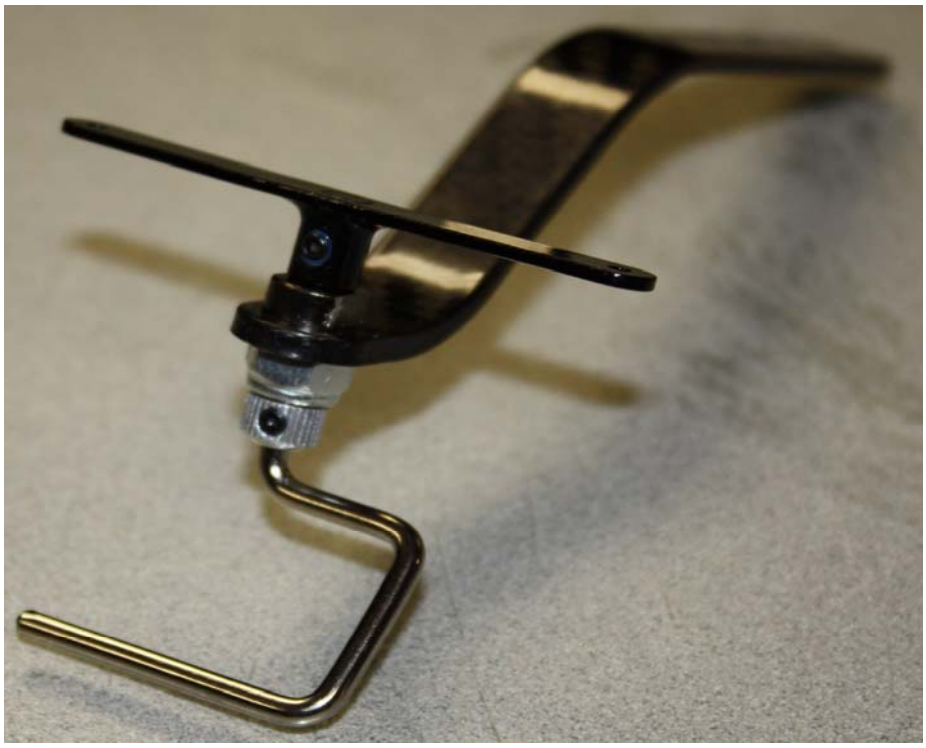
15. We'll begin by installing the landing gear. Locate the aluminum main landing gear, 4 4mm bolts, lock nuts and washers. Insert the gear into the slot on the bottom of the fuselage and center it in the slot. Secure the landing gear with 4 4mm bolts, washers and nylon insert lock nuts by inserting the bolts and washers into the pre-drilled holes in the aluminum gear mounts inside the fuselage with a long T-handle wrench. Secure with the 4mm nylon insert lock nuts.

16. Locate the 2 axles, 2 locking nuts, 2 wheels, 2 wheel collars and 2 wheel pants from the hardware package. Place the wheel onto the axle and secure with 2 wheel collars. Place the threaded portion of the axle through the hole in the landing gear and screw the lock nut onto the axle, but do not tighten completely. There is a pre-cut slot in the wheel pant to allow it to fit over the axle. Slide the wheel pant into position over the axle and tighten the nut on the axle, taking care to make sure the wheel pant is positioned properly. You may find it necessary to cut about 3/8" off the end of the axle so that it doesn't come into contact with the side of the wheel pant. A Dremel rotary tool with a cut-off wheel or a hack saw works well in this application. Be sure to wear safety glasses!

17. When satisfied with the position of the wheel pants, drill a hole though the plywood plate that is glued inside the pant at the location of the hole in the landing gear. Secure the pant in position with the provided 3mm bolt and blind nut. Repeat this process for the remaining wheel pant.

18. While the Edge is still upside down let's install the rudder and the tailwheel assembly. As you did with the ailerons and elevators, glue the hinges into the rudder first with epoxy and allow to cure. Use a pushrod to apply epoxy to the holes in the rudder post and push the rudder into position and wipe away any excess epoxy with a paper towel and denatured alcohol.

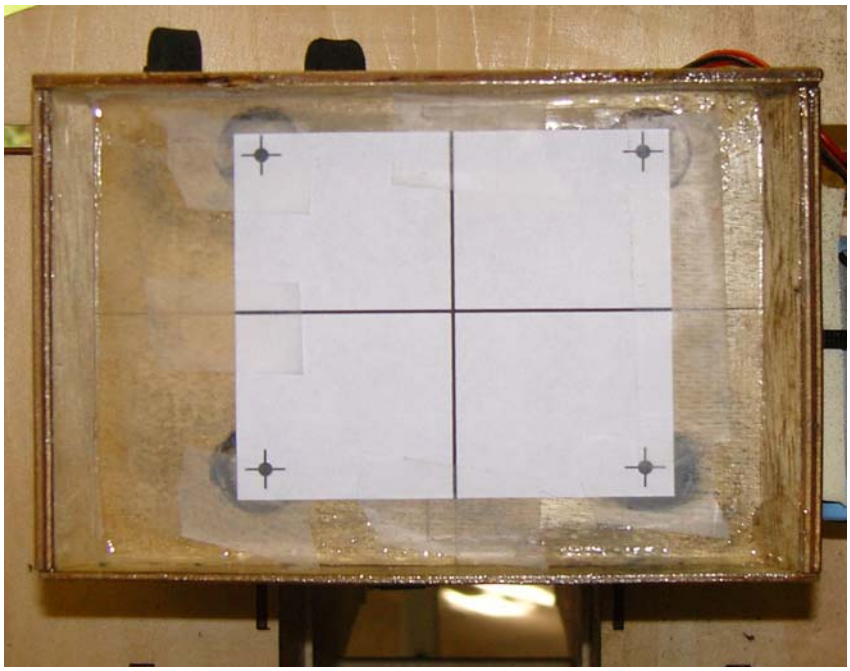
19. Assemble the tailwheel assembly as shown. For best results file a flat spot at the location that each set screw will seat and use a drop of blue Loctite on each set screw.



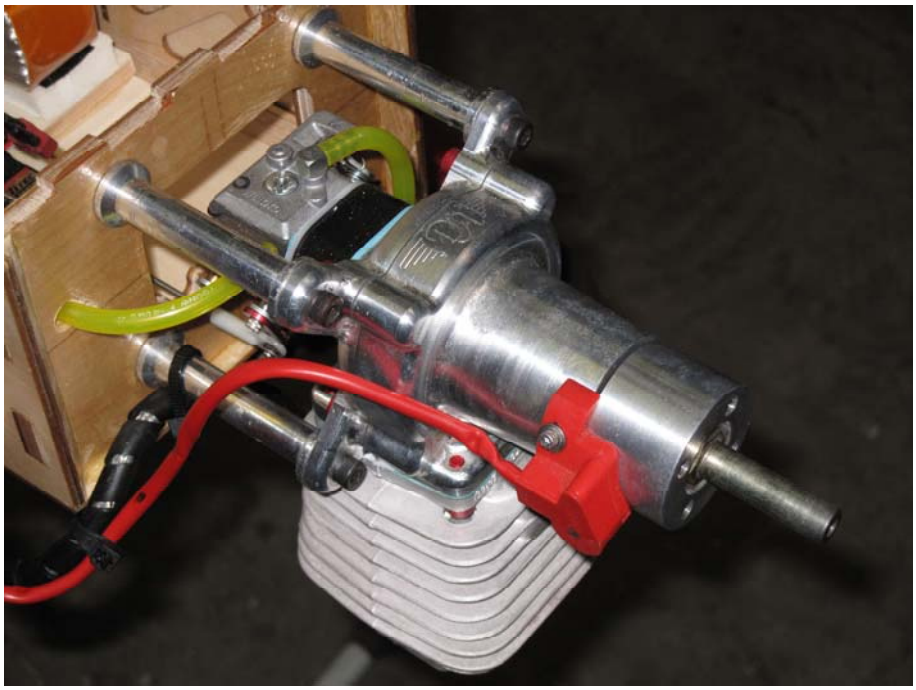
20. Place the tailwheel assembly on the rear bottom of the fuselage and secure with a piece of tape. Drill holes at the location of the mounting holes and secure the tailwheel bracket with the included course thread wood screws.

21. Mount the tiller arm as shown and insert the ends of the springs into the holes in the ends of the arms and bend to secure.

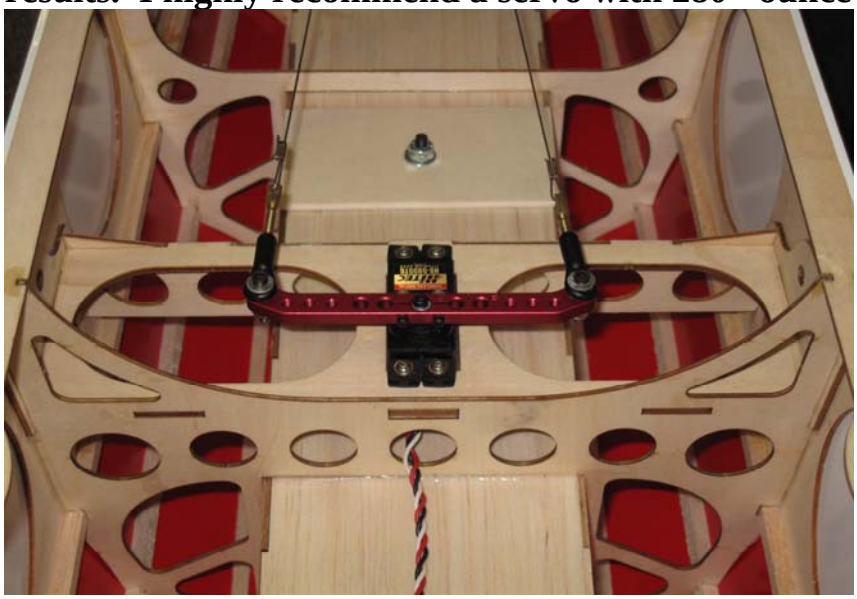
22. Next let's install the motor/engine. We have made this process very easy. The center and offset marks have been scribed into the front of the firewall with a laser. Print out the engine mounting template for your chosen engine. If using the DA-50 simply drill the firewall at the locations laser scribed on the firewall. If using another make tape the template onto the front of the firewall making sure to align the horizontal and vertical lines on the template with the laser scribes lines on the firewall. Be sure to use the offset line to the right of the vertical center line to accommodate for the motor offset due to the built in right thrust angle in the motor box.



Distance from the front face of the motor box to the motor drive washer is 6.32"(This is the length of the DA-50 with 2.5 inch standoffs). Drill holes at the marked locations and install the engine using the recommended mounting bolts.



23. Install your rudder servo using the supplied hardware with the output shaft toward the front of the plane. We used the Hitec 5955 and Hitec 7955 in our prototypes with great results. I highly recommend a servo with 280+ ounce inches of torque for best results.



We are using the SWB 4" offset rudder arm. We highly recommend the use of this quality product to ensure correct geometry.

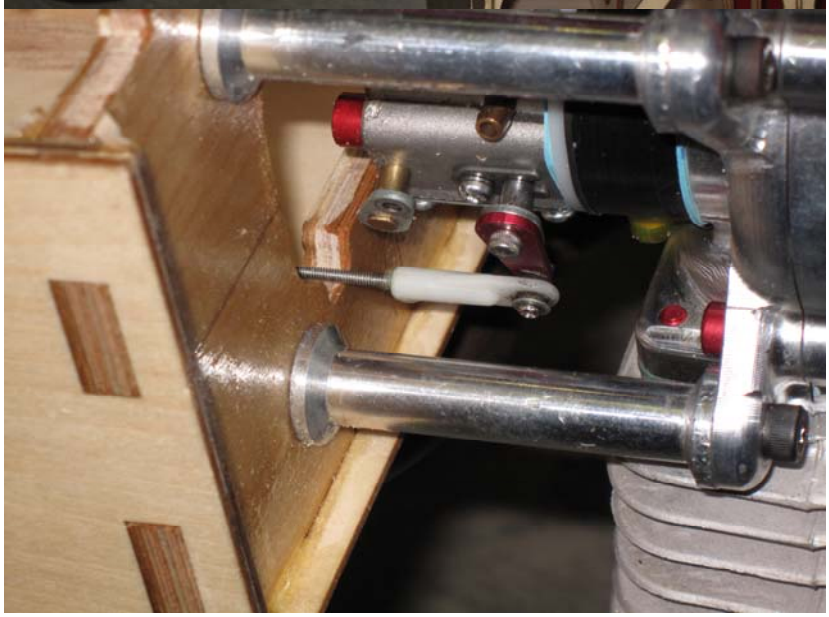
24. Next let's install the pull-pull rudder cables. Look at the rear of the fuselage just above the horizontal stabilizer location and you will find the location of the pull-pull cable exit slot. Use a sharp hobby knife to remove the covering from this slot on each side of the fuselage.

25. Assemble one end of the linkage by inserting the pull-pull cable into one of the aluminum tubes, through the hole in the brass pull-pull fitting and back through the aluminum crimp tube. Loop the cable back through the crimp tube a second time and crimp with side cutters.

26. Insert the bare end of the cable into the slot in the rear of the fuselage and feed it forward into the canopy area and make up the same type of linkage as you did previously. Electronically center your servo. Secure the linkage at both ends with a 3mm bolt and nylon insert lock nut. Repeat for the other side. Pull-pull cables should be <u>crossed</u> for this installation on the Edge.

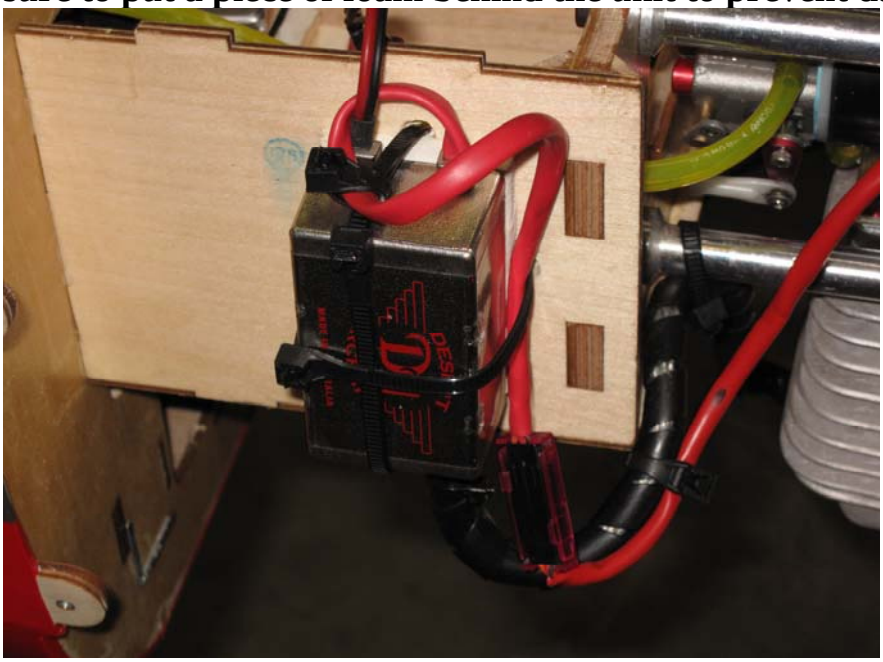
27. Slide both stab/elevator assemblies onto the carbon fiber mounting tube and secure with 2 3mm bolts inserted through a washer and the mounting tabs and into the corresponding blind nuts already installed in the fuselage. Be sure to use a drop of blue Loctite on all bolts!!!

28. Install your choice of throttle servo in the location in the bottom of the motor box. If using a tuned pipe or canister you will need to install a couple of 3/8" hardwood rails to elevate the servo and prevent it from being too close to the header. If using a standard muffler simply bolt the servo into the pre-cut hole. You will need to fabricate your own linkage to accommodate your choice of engine. I used a short length of 2-56 threaded rod and 2-56 ball links.

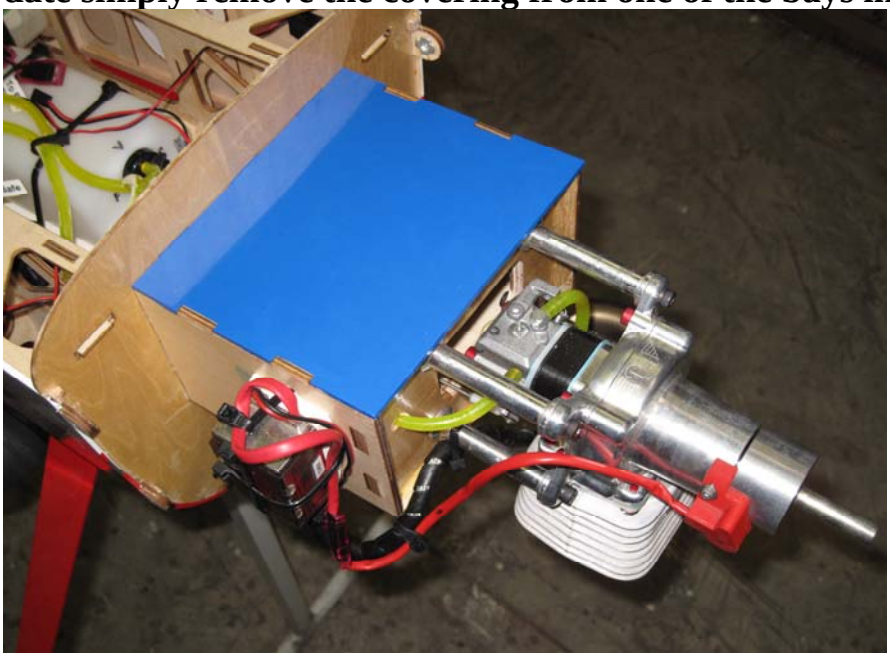


29. Assemble and install the gas tank in front of the wing tube socket using nylon cable ties through the mounting tabs and around the tank. I suggest using a piece of foam under the tank.

30. Install your ignition unit on the side of the engine box using nylon cable ties. Make sure to put a piece of foam behind the unit to prevent damage from vibration.

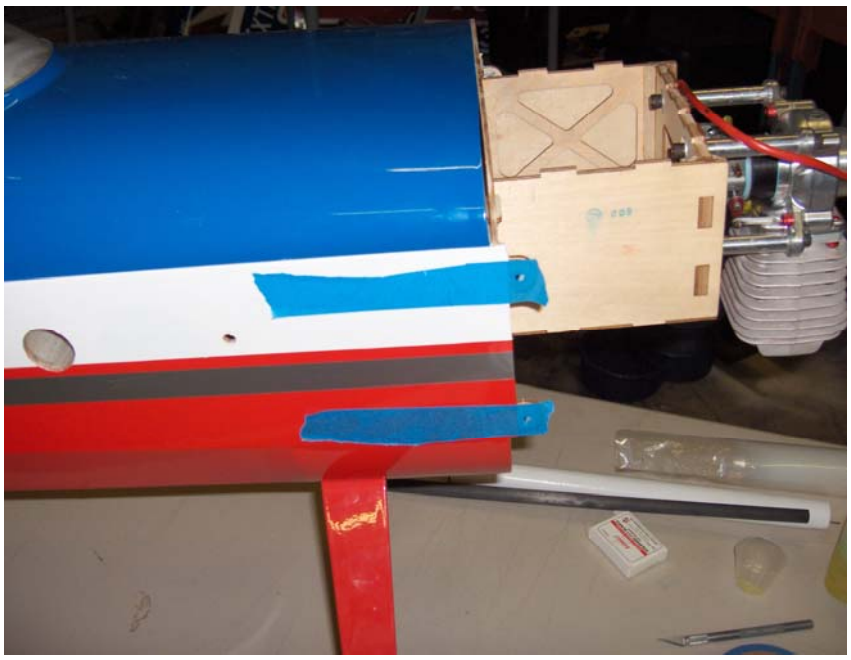


31. Once you are satisfied with your throttle, tank and ignition installation glue the engine box top in place with epoxy. Do not omit this piece as it adds a great deal of strength and rigidity to the engine box. If you need access to the interior of the engine box at a later date simply remove the covering from one of the bays in the engine box top.



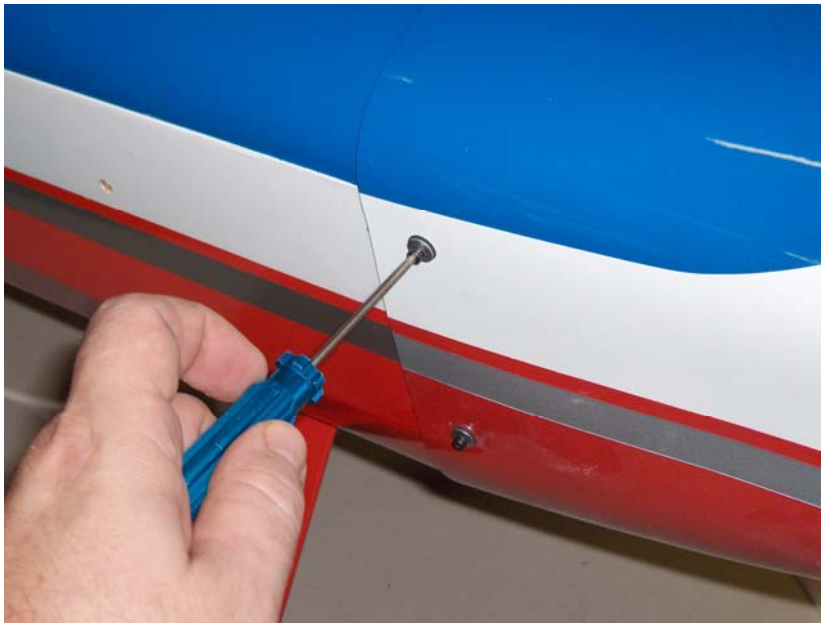
Now let's mount the cowl.

32. Before mounting the cowl place four strips of masking tape on the fuselage as shown and use a felt tipped marker to mark the location of the bolt holes in the cowl mounting tabs.



33. Place the canopy/hatch onto the fuselage to aid in alignment. Peel the tape back just behind the F1 former and place the cowl into position. You will need to open the cowl to clear the cylinder head of the engine. Place your spinner (4 inch) on the motor to help align with cowl. View the cowl from several angles to insure that it is positioned properly. When satisfied put the four tape strips back into position and drill a 1/8" hole at the location of each of the 4 ink marks.

34. Secure the cowl using 4 3mm socket head bolts in conjunction with 4 bonded sealing washers as shown.



35. Install your switches, battery and receiver as well as prop and spinner to achieve proper center of gravity.

<u>Pipe or canister installation hints</u>

You may wish to install a tuned exhaust system in your aircraft. We have built a pipe tunnel into the bottom of your aircraft to make this a relatively easy task. Some of the advantages of using a tuned exhaust are an increase in power and a reduction in engine noise. There are many makes of tuned exhaust systems available for 50cc engines. For the DA-50 you will need to purchase a wrap around header with a 25mm drop which will position the pipe in the center of the tunnel. You will also need to purchase a Teflon coupler and spring clamps. Here are a few pictures of our installation of an ES Composites carbon fiber tuned (www.escomposites.com) pipe using a Dave Brown Products pipe mount. Notice we have put a ring of high temperature silicon gasket maker around the pipe to prevent the melting of the nylon cable tie we are using to retain the tuned pipe.

This completes the assembly of the 50cc Edge 540T. As a final step clean the entire aircraft with glass cleaner, then apply a coat of spray-on wax and buff the finish to a high gloss with a micro fiber rag. My favorite product for this is Eagle One Wet Wax AS-U-DRY, available in the automotive section of most Wal-Marts, K-marts, Sears, Targets, etc. People often ask me at trade shows how I get the planes to look so shiny, this is my method. You may wish to apply all of your graphics before applying the coat of wax.

Set-up and trimming

Besides basic assembly, this is the most important part of preparing your airplane for flight. It can also be the most time consuming, but once your plane is properly dialed in you will agree it was time well spent.

The center of gravity range for the 50cc Edge 540T begins at 6.25 inches from the leading edge of the wing measured at the root and extends back to 7 inches. CG is determined with the EDGE in the upright position. One of the best ways to dial in the proper CG for your aircraft is the 45 degree line test. Fly the aircraft in front of you from left to right (or right to left if you prefer) at full throttle. Pull the aircraft into a 45 degree up line and establish this line. Roll the aircraft inverted, neutralize the elevator and pay close attention to what the plane does. Ideally the plane will continue on this line for several hundred feet before it starts to slowly level off. If the airplane immediately drops the nose and dives toward the ground it is nose heavy. If it begins to climb inverted toward the gear it is tail heavy. There is no need to have the Edge excessively tail heavy to perform 3D maneuvers. At this time you will also want to balance your plane laterally. Add a small amount of weight to the light wingtip to achieve proper lateral balance.

Control surface throws

I highly recommend that you purchase a throw meter that measures in degrees. There are several units available commercially. These units are a great aid in set-up and definitely beat the "that looks about right" method. For any type of precision flying, surfaces that travel equal distances are a must. The following control surface travels are what I use on my own Edge. These are a good starting point, but are by no means the only way to set up the Extra. Start here and then adjust to fit your own preferences and style of flying.

Elevator: 8-10 degrees low rate, 18-20% exponential; all you can get high rate, 60-65% exponential

Aileron: 20 degrees low rate, 30-40% exponential; all you can get high rate, 65-70% exponential

Rudder: 20 degrees low rate, 50% exponential; all you can get for high rate, 80-90% exponential.

Again, this is just a starting point. Adjust to your liking.

Thanks again for your purchase of the Extreme Flight RC 50cc Edge 540T ARF. I hope you enjoy assembling and flying yours as much as I have mine.

See you at the flying field!

Chris Hinson

Extreme Flight RC